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## Clean Claims

1. A bottoming device for forming a cross bottom paper bag, the device configured to form the cross bottom of the paper bag by providing folds at extremities of a tubular segment from which the bag is produced such that lines of a glue are applied to at least one of a folded bottom on the extremities of the tubular segment and a sheet to be glued with the bottom, and to connect and glue the folded bottom and the sheet, the bottoming device comprising

a gluer having an application head with a glue duct in which the glue is exposed to a pressure that is higher than ambient pressure such that the glue is transported throughout the application head,

the application head including a plurality of valves each having at least one glue output orifice through which the glue is directly applied to the at least one of the folded bottom and the sheet, the valves being arranged in a configuration that includes at least a first valve row (VRi) and a second valve row (VRii) with each of the first and second valve rows extending along a length of the application head in a direction (y) that is transverse to a bag transfer direction (x), and

a glue circulation channel that provides for circulation of the glue within the application head, the glue circulation channel including (i) a first transverse channel and a second transverse channel each extending along the length of the application head in the (y) direction, and (ii) a connection channel extending across the application head in the (x) direction, the connection channel connecting an end of the first transverse channel to an adjacent end of the second transverse channel, the glue circulation channel providing for glue flow through the first transverse channel, across the connection channel, and through the second transverse channel to drain from the application head.

2. The bottoming device in accordance with claim 1 wherein the glue application is performed between the glue output orifice and the at least one of the sheet and the folded bottom in a contact-free manner.

3. The bottoming device in accordance with claim 1 wherein the valve configuration includes a plurality of valve rows (VR<sub>i</sub>, VR<sub>n</sub>).

4. The bottoming device in accordance with claim 1 wherein each of the first and second valve rows includes a plurality of valves.

5. The bottoming device in accordance with claim 1 wherein each of the valves includes a plurality of glue output orifices.

6. The bottoming device in accordance with claim 5 wherein the application head has a plate-like form whereby the glue output orifices are provided on a side of the application head facing the bag that is being formed.

7. The bottoming device in accordance with claim 3 wherein each of the plurality of valve rows includes a plurality of valves.

8. The bottoming device in accordance with claim 1 wherein the valves are provided on a side of the application head facing away from the bag that is being formed.

9. The bottoming device in accordance with claim 5 wherein a distance (A) between adjacent orifices along the (y) direction is less than a breadth (B) of each of the valves.

10. The bottoming device in accordance with claim 7 wherein each of the valve rows is offset laterally in the (y) direction from an adjacent valve row.

11. The bottoming device in accordance with claim 5 wherein the glue output orifices are located in one line extending along the length of the application head in the (y) direction.

12. The bottoming device in accordance with claim 5 wherein the valves are supplied with the glue by at least one borehole or chamber in the application head.

13. The bottoming device in accordance with claim 12 wherein the borehole or chamber extends substantially transverse to the bag transfer direction (x).

14-15. (Canceled)

16. The bottoming device in accordance with claim 1 wherein the application head is moveable in the (y) direction transverse to the bag transfer direction (x).

17. The bottoming device in accordance with claim 1 wherein the application head is rotatable from a glue application position.

18. The bottoming device in accordance with claim 17 wherein the rotatable application head is positionable in various stationary positions each dedicated to a specific function.

19. The bottoming device in accordance with claim 18 wherein at least two of the stationary positions are dedicated to at least two functions including applying the glue to form the bag, sealing the glue output orifices, removing any glue contaminating the application head, and rinsing the application head.

20. The bottoming device in accordance with claim 5 wherein a distance between the output orifices can be selected during the application of the glue.

21. The bottoming device in accordance with claim 1 wherein the glue duct has a water connection.

22. The bottoming device in accordance with claim 21 wherein the water connection has a check valve.

23. The bottoming device in accordance with claim 1 wherein the glue duct includes at least one of a pressure relief valve, a pressure sensor, and a pressure controller.

24. The bottoming device in accordance with claim 1 wherein the application head includes a projection on a side facing the bag that is being formed, and the projection is closer to the bag than is the output orifice during the glue application.

25. The bottoming device in accordance with claim 1 wherein the application head includes flexible lines that provide at least one of the glue and water to the head.

26. The bottoming device in accordance with claim 1 wherein each of the valves is controllable independently of the other valves such that the glue application from the respective glue output orifice can be selectively started and stopped.

27. The bottoming device in accordance with claim 26 wherein the valve is controllable to open and close during the glue application.

28. The bottoming device in accordance with claim 1 wherein the application head includes at least five valves.

29. The bottoming device in accordance with claim 9 wherein a sum (D) of the distances (A) between the glue output orifices in each of the valves is less than the breadth (B) of the valve.

30. The bottoming device in accordance with claim 1 wherein the glue duct has a cross-sectional area that is at least half as large as a sum of cross-sectional areas of the glue output orifices.

31. The bottoming device in accordance with claim 1 further comprising a metallic cylinder hard counter bearing on which at least one of the folded bottom and the sheet are located during the glue application.

32. The bottoming device in accordance with claim 1 wherein the application head includes at least one stopper located in a transport path of the glue to the valves with which at least one of the glue duct and the glue output orifices can be sealed.

33. The bottoming device in accordance with claim 32 wherein the stopper includes a pin.

34. The bottoming device in accordance with claim 33 wherein the pin is rotatably held in a format plate having a glue outlet such that rotation of the pin seals at least one of the duct and the glue output orifices.

35. The bottoming device in accordance with claim 33 wherein the pin is inserted in at least a part of the glue output orifice such that a main axis of inertia of the pin coincides with an axis of the glue output orifice.

36. A process for the operation of a bottoming device in accordance with claim 1 wherein for a specific gluing format at least one of the valves is opened or closed at certain points of time relative to the other valves during the glue application.

37. The process in accordance with claim 36 wherein a time period between the opening and the closing of the valve is less than 5 milliseconds.

38. A bottoming device that forms a cross bottom paper bag, the device configured to form the cross bottom of the bag by providing folds at extremities of a tubular segment from which the bag is produced such that lines of a glue are applied to at least one of a folded bottom on the extremities of the tubular



segment and a sheet to be glued with the bottom, and to connect and glue the folded bottom and the sheet, the bottoming device comprising

a gluer having an application head including a plurality of valves each having at least one glue output orifice through which the glue is directly applied under pressure to the at least one of the folded bottom and the sheet,

the valves being arranged in a configuration that includes a plurality of valve rows ( $VR_i$  to  $VR_n$ ) each extending along a length of the application head in a direction ( $y$ ) that is transverse to a bag transfer direction ( $x$ ), with each of the valve rows including a plurality of valves ( $V_i$  to  $V_n$ ) arranged along a length of the valve row, and

a glue circulation channel that provides for continuous circulation of the glue within the application head, the glue circulation channel including (i) a first transverse channel and a second transverse channel each extending along the length of the application head in the ( $y$ ) direction, and (ii) a connection channel extending across the application head in the ( $x$ ) direction, the connection channel connecting an end of the first transverse channel to an adjacent end of the second transverse channel, the glue circulation channel providing for glue flow through the first transverse channel, across the connection

channel, and through the second transverse channel to drain from the application head.

39. The bottoming device in accordance with claim 38 wherein each of the valves includes a plurality of glue output orifices.

40. The bottoming device in accordance with claim 39 wherein each of the valve rows is offset laterally in the (y) direction from an adjacent valve row.

41. The bottoming device in accordance with claim 40 wherein each of the valves includes a group of glue output orifices oriented in a line extending in the (y) direction and having an orifice group width (D), the orifice group being centered within a breadth (B) of the valve.

42. The bottoming device in accordance with claim 41 wherein the offset (C) is equal to a lateral distance between the centered orifice group in one of the valve rows and the centered orifice group in an adjacent valve row.

43. A bottoming device that forms a cross bottom paper bag, the device configured to form the cross bottom of the bag by providing folds at extremities of a tubular segment from which

the bag is produced such that lines of an adhesive are applied to at least one of a folded bottom on the extremities of the tubular segment and a sheet to be adhered with the bottom, and to connect and adhere the folded bottom and the sheet, the bottoming device comprising

an adhesive application head including a plurality of valves each having a plurality of adhesive output orifices through which the adhesive is directly applied under a higher-than-ambient pressure to the at least one of the folded bottom and the sheet in a contact-free manner, the valves being arranged in a configuration that includes a plurality of valve rows ( $VR_i$  to  $VR_n$ ) each extending along a length of the application head in a direction ( $y$ ) that is transverse to a bag transfer direction ( $x$ ), with each of the valve rows including a plurality of valves ( $Vi$  to  $Vn$ ) arranged along a length of the valve row, and

an adhesive circulation channel that provides for continuous circulation of the adhesive within the adhesive application head, the adhesive circulation channel including (i) a first transverse channel and a second transverse channel each extending along the length of the application head in the ( $y$ ) direction, and (ii) a connection channel extending across the application head in the ( $x$ ) direction, the connection channel connecting an end of the first transverse channel to an adjacent end of the second transverse channel, the adhesive circulation

channel providing for adhesive flow through the first transverse channel, across the connection channel, and through the second transverse channel to drain from the application head.

44. (Canceled)